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Challenges in the Development of Sensors for Monitoring Automobile Emissions

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Beginning in 1994, The California Air Resources Board (CARB) and the U.S. EPA began implementing regulations which require auto makers to incorporate comprehensive on-board diagnostics onto new vehicles. The intent of these regulations is to ensure that the vehicle operator is informed when emission control systems are no longer performing adequately. Inexpensive, reliable, and accurate sensors will be an essential ingredient of any automobile engine or catalytic converter monitoring system. As part of the Partnership for New Generation Vehicles, Lawrence Livermore National Laboratory has been developing solid-state electrochemical sensors for this purpose. Most recently, our work has focused on the development of hydrocarbon sensors for monitoring catalytic converter performance. Previous work was concerned with the development of oxygen sensors having appropriate sensitivity for lean-burn engines. We have defined operational limits for oxygen sensors and have developed new materials for hydrocarbon sensors. Technical results as well as challenges to be met in the development of new sensors for monitoring automobile emissions will be presented.

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